IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: **Bang, et al.**	§	
Serial No.: **10/081,312**	§	Group Art Unit: **1762**
Docket No.: **2929D1/TCG/PMD/LE**	§	
Confirmation No.: **6198**	§	Examiner: **Markham, Wesley D.**
Filed: **February 21, 2002**	§	
For: **Method of Forming a Corrosion Resistant Coating**	§	

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

CORRECTED APPEAL BRIEF

In response to the Notice of Non-Compliance with 37 C.F.R. §1.192(c), the Appellants re-submit this Corrected Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1762 dated July 23, 2004, rejecting claims 1-19. The Appellants believe that no fee is due in connection with this response. However, the Commissioner is hereby authorized to charge counsel's Deposit Account No. 20-0782 for any fees, including extension of time fees, necessary to make this Brief timely and acceptable to the Patent Office.

REAL PARTY IN INTEREST

The real party in interest is Applied Materials, Inc., located in Santa Clara, CA.

RELATED APPEALS AND INTERFERENCES

Appellant asserts that no other appeals or interferences are known to the Appellant, the Appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1-19 are pending in the application. Claims 1-9 were originally presented in the application. Claim 10-19 were subsequently added to the application in a response to a non-final office action submitted May 7, 2004. Claims 1-19 stand rejected in view of several references as discussed below. The rejection of claims 1-12, 14-15 and 18-19 based on the cited references is appealed.

Claims 13 and 16-17 stand rejected under 35 CFR §112. The rejection of claims 13 and 16-17 are not presently appealed. The Appellants agree that the rejected claims do not conform to 35 CFR §112 as presently written. The Appellants intend to address the rejection of these claims pending favorable resolution of this appeal. The pending appealed claims are shown in the attached Appendix.

STATUS OF AMENDMENTS

No amendments to the claims were submitted in this application subsequent to final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention provides a method for forming a corrosion resistant coating. In the embodiment of independent claim 1, a method for forming a corrosion resistant coating comprises coating a component part 100 with a magnesium fluoride coating 150 (p. 3, ll. 28-29, p. 4, ll. 12-13; Fig. 1b), wherein said magnesium fluoride coating has a density of at least about 85% (p. 5, ll. 4-14) and a purity of at least about

99% (p. 4, l. 33 - p. 5, l. 3), and said coating reduces corrosion of said component part upon exposure to a corrosive environment (p. 5, ll. 19-22).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1-7, 10-12, and 18-19 stand rejected under 35 U.S.C. §103(a) as being obvious in light of Japanese Patent Application Publication No. JP08141276, Published December 22, 1997 by Toyoda et al. (hereinafter *Toyoda*), in view of United States Patent No. 6,139,983 issued October 31, 2000 to Ohashi et al. (hereinafter *Ohashi*), and further in view of United States Patent No. 6,287,683 issued September 11, 2001 to Itoh et al. (hereinafter *Itoh*), United States Patent No. 4,637,684 issued January 20, 1987 to Tomita et al. (hereinafter *Tomita*), and United States Patent No. 6,162,495 issued December 19, 2000 to Morton (hereinafter *Morton*).

2. Claim 8 stands rejected under 35 U.S.C. §103(a) as being obvious in light of *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 5,643,483 issued July 1, 1997 to Kubota et al. (hereinafter *Kubota*).

3. Claim 9 stands rejected under 35 U.S.C. §103(a) as being obvious in light of *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 6,215,806 issued April 10, 2001 to Ohmi et al. (hereinafter *Ohmi*).

4. Claims 14-15 stand rejected under 35 U.S.C. §103(a) as being obvious in light of *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 5,958,155 issued September 28, 1999 to Kawamata et al. (hereinafter *Kawamata*).

5. Claims 1, 3-6, 10-11, and 18-19 stand rejected as U.S.C. §103(a) as being obvious in light of *Tomita* in view of *Morton*.

6. Claim 2 stands rejected U.S.C. §103(a) as being obvious in light of *Tomita* in view of *Morton*, and in further view of *Itoh*.

7. Claim 9 stands rejected U.S.C. §103(a) as being obvious in light of *Tomita* in view of *Morton*, in further view of *Itoh*, and in further view of *Ohmi*.

ARGUMENT

1. Claims 1-7, 10-12, and 18-19

Claims 1-7, 10-12 and 18-19 stand rejected as being unpatentable over *Toyoda*, in view of *Ohashi*, *Itoh* and *Morton*. The Applicants disagree.

Claim 1 recites limitations not taught or suggested by the cited combination of references. *Toyoda* teaches a method of coating an aluminum nitride part with a coating of magnesium fluoride by vacuum deposition or sputtering, and specifically by RF-sputtering using a MgF_2 target of 99.5% purity. (*Toyoda*, ¶12-14) The Examiner asserts that *Toyoda's* disclosure of using a deposition sputtering target having a purity of 99.5% would suggest to one of ordinary skill in the art that *Toyoda* is concerned with and desires depositing a coating having a high purity. (Final Office Action, p. 5, ll. 15-18.) The Examiner goes so far as to say that because Toyoda discloses using a target that is 99.5% pure, "one of ordinary skill in the art would have been motivated to seek out appropriate process conditions to deposit a magnesium fluoride film of as high purity as possible." (Final Office Action, p. 20, ll. 17-19.) The Applicants strongly disagree.

Although *Toyoda* does disclose the benefits of a magnesium fluoride coating, *Toyoda* fails to teach or suggest a benefit of forming a highly dense, highly pure coating, as recited in claim 1. As the Examiner admits, *Toyoda* is silent regarding the density and purity of the magnesium fluoride coating as well as the process needed to deposit the coating. (Final Office Action, p. 5, ll. 12-15.) Moreover, utilizing a high purity sputtering target does not necessarily imply a specific purity or density for the resultant coating. As such, *Toyoda* does not teach or suggest a method for forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

Ohashi teaches a corrosion-resistant wafer supporting member having a corrosion-resistant layer which may comprise magnesium fluoride. *Ohashi* discloses that the method of producing the fluoride coating is not particularly limited, so long as defects and pinholes are not formed in the film. (*Ohashi*, column 6, lines 15-18). Like *Toyoda*, *Ohashi* is also silent regarding the density and purity of the magnesium fluoride coating. Furthermore, *Ohashi* does not teach or suggest that either the purity or the density of the magnesium fluoride layer has any effect in the formation of an effective protective coating in a corrosive semiconductor process environment, other than the broad statement contained only in the summary of the invention regarding defects and pinholes cited above. At best, the combination teaches that the coating of *Toyoda*, applied from a high purity target, should not have pin holes. Thus, the combination of *Toyoda* and *Ohashi* fails to teach or suggest a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

Itoh discloses an anti-fogging coating formed on the surface of an optical substrate. (*Itoh*, Abstract.) *Itoh* teaches that the anti-fogging coating may be magnesium fluoride and states broadly that adjustment of the packing rate of a magnesium fluoride coating can be performed by controlling the degree of vacuum and the film-forming temperature in a vacuum process. (*Itoh*, col. 5, ll. 1-24.) The only more specific example given is that by controlling the degree of vacuum and process temperature to be low in an electron beam deposition process, the packing rate tends to be lowered. (*Itoh*, col. 5, ll. 10-14.)

The Examiner contends that *Itoh* teaches a method of controlling the packing rate of a magnesium fluoride film, and that it would be obvious to use that method in combination with *Toyoda* and *Ohashi* to form a magnesium fluoride coating having a density of at least about 85%. However, neither *Toyoda*, *Ohashi*, nor *Itoh* teaches or suggests a method of forming a magnesium fluoride coating having a density of at least about 85%. Moreover, as discussed above, the desire to have a pinhole and defect-free film is neither a suggestion nor motivation to deposit a film having a density of at least about 85% or a purity of at least about 99%, as recited in claim 1. As such, the combination fails to teach or suggest a method for forming a magnesium fluoride

coating having a density of at least about 85% and a purity of at least about 99% as recited by claim 1.

Tomita teaches that a thin layer of magnesium fluoride may be formed on a surface of a prism by evaporation and may have a low porosity by heating the substrate to the order of 300°C during evaporation. (*Tomita*, col. 4, ll. 39-53.) *Tomita* is silent with respect to the specific density and purity of the magnesium fluoride coating and does not mention any corrosion resistant benefits of the film. Therefore, the combination of *Tomita* with *Toyoda, Ohashi* and *Itoh* teaches only a magnesium fluoride coating that should be free of pinholes and defects, where the packing rate of the film can be adjusted by controlling the degree of vacuum and the film-forming temperature and where low porosity can be obtained by heating the substrate to the order of 300°C during evaporation. However, this combination still fails to teach or suggest a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

Morton teaches an electron beam physical vapor deposition method whereby a pure and dense coating of magnesium fluoride may be deposited on a substrate of aluminum in a vacuum chamber having a pressure of $1x10^{-6}$ torr or less. (*Morton*, col. 3, ll. 50-65.) *Morton* is silent with respect to the density and purity of the magnesium fluoride coating and with respect to other processing conditions. Moreover, *Morton* is silent with respect to the effect of the processing conditions on the density of the magnesium fluoride coating. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to "optimize," the temperature and pressure of the magnesium fluoride deposition process of *Toyoda* through routine experimentation in order to obtain an "optimized" magnesium fluoride coating that has both the high purity and density recited in claim 1. However, the Examiner erroneously equates the statement of *Ohashi* that the coating be free of defects and pinholes with having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

A film need not be highly pure nor highly dense in order to be free of defects and pinholes. In particular, *Ohashi* teaches a pressure of $5.25x10^{-3}$ - $3.75x10^{-2}$ torr to deposit a magnesium fluoride film that is free of pinholes and defects. There is no suggestion in *Ohashi*, or any of the other cited references, to modify the methods of

Ohashi – *e.g.*, that there remains a problem to be solved in the level of pinholes and defects in the films of *Ohashi*. Specifically, there is no suggestion to reduce the chamber pressure below the range taught by *Ohashi* (for example, to 1 x 10^{-6} torr as in *Morton*), or that doing so would yield a film having any specific density and purity.

A teaching of how to produce a magnesium fluoride film having the specific properties recited by claim 1 is simply not taught or suggested by any permissible combination of the references. As such, a *prima facie* case of obviousness has not been established as there is no teaching or suggestion in the art to combine the references in a manner that results in a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

Thus, the Applicants submit that independent claim 1, and all claims depending therefrom, are patentable over *Toyoda* in view of *Ohashi* and further in view of *Itoh*, *Tomita*, and *Morton*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

2. Claim 8

Claim 8 stands rejected as being unpatentable over *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 5,643,483 issued July 1, 1997 to Kubota et al. (hereinafter *Kubota*). The Applicants disagree.

Claim 8 recites limitations not taught or suggested by the prior combination of the cited references. As discussed above, *Toyoda*, *Ohashi*, *Itoh*, *Tomita*, and *Morton* are not combinable in a manner which yields the invention recited in claim 1, from which claim 8 depends. *Kubota* teaches and suggests a ceramic heater having a smooth surface in the range of from 0.01μm – 0.1 μm. (*Kubota*, col. 4, ll. 5-16) *Kubota* does not teach or suggest a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. Therefore, *Kubota* may not be used to modify the teachings of the previously cited references to yield a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. As such, a *prima facie* case of

obviousness has not been established because any permissible combination of the cited references still fails to yield the invention as recited in claim 1.

Thus, the Applicants submit that claim 8 is patentable over *Toyoda* in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of *Kubota*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

3. Claim 9

Claim 9 stands rejected as being unpatentable over *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 6,215,806 issued April 10, 2001 to Ohmi et al. (hereinafter *Ohmi*). The Applicants disagree.

Claim 9 recites limitations not taught or suggested by the combination of the cited references. As discussed above, *Toyoda*, *Ohashi*, *Itoh*, *Tomita*, and *Morton* are not combinable in a manner which yields the invention recited in claim 1, from which claim 9 depends. *Ohmi* teaches and suggests a fluoride passivated inner surface of an excimer laser that may comprise magnesium fluoride. (*Ohmi*, Abstract.) *Ohmi* teaches that the magnesium fluoride may be heat treated at a temperature between 150-450 degrees Celsius after it is formed. (*Ohmi*, col. 11, ll. 55-61.) The heat treatment cited by the Examiner in the temperature range of 200 to 600 degrees Celsius for an iron fluoride film, not for a magnesium fluoride film. (*Ohmi*, col. 12, l. 50 – col. 13, l. 67.) Therefore, *Ohmi* does not teach or suggest annealing a magnesium fluoride film at a temperature of at least about 600°C, as recited in claim 9.

Moreover, *Ohmi* does not teach or suggest a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. Therefore, *Ohmi* may not be used to modify the teachings of the previously cited references to yield a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established because any permissible combination of the cited references still fails to yield the invention as recited in claim 1.

Thus, the Applicants submit that claim 9 is patentable over *Toyoda* in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of *Ohmi*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

4. Claims 14-15

Claims 14-15 stand rejected under 35 U.S.C. §103(a) as being obvious in light of *Toyoda*, in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of United States Patent No. 5,958,1555 issued September 28, 1999 to Kawamata et al. (hereinafter *Kawamata*). The Applicants disagree.

Claims 14-15 recite limitations not taught or suggested by the combination of the cited references. As discussed above, *Toyoda*, *Ohashi*, *Itoh*, *Tomita*, and *Morton* are not combinable in a manner which yields the invention recited in claim 1, from which claims 14-15 depend. *Kawamata* teaches a high speed sputtering process for forming a thin film of magnesium fluoride on a substrate. (*Kawamata*, Abstract.) *Kawamata* does not teach or suggest a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. Therefore, *Kawamata* may not be used to modify the teachings of the previously cited references to yield a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established because any permissible combination of the cited references still fails to yield the invention as recited in claim 1.

Thus, the Applicants submit that claim 8 is patentable over *Toyoda* in view of *Ohashi*, in further view of *Itoh*, *Tomita*, and *Morton*, and in further view of *Kawamata*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

5. Claims 1, 3-6, 10-11, and 18-19

Claims 1, 3-6, 10-11, and 18-19 stand rejected as being unpatentable over *Tomita* in view of *Morton*. The Applicants disagree.

Claim 1 recites limitations not taught or suggested by the prior art, either alone or in combination. As discussed above, *Tomita* discloses that a low porosity magnesium fluoride coating may be formed by heating the substrate to about 300°C, but fails to

teach or suggest a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

As also discussed above, *Morton* teaches an electron beam physical vapor deposition method whereby a pure and dense coating of magnesium fluoride may be deposited on an aluminum substrate in a vacuum chamber having a pressure of $1x10^{-6}$ torr or less. *Morton* is also silent with respect to the density and purity of the magnesium fluoride coating. Moreover, neither *Morton* nor *Tomita* contain any suggestion to combine the low pressure deposition method of *Morton* with the method of *Tomita*. The Examiner contends that *Tomita* desires a pure, dense magnesium fluoride film. However, *Tomita* makes no reference to the purity level of the magnesium fluoride film nor to the specific density of the film obtainable by the *Tomita* process. Therefore, a *prima facie* case of obviousness has not been established as there is no motivation to modify the method of *Tomita* with the teachings of *Morton* in a manner which yields a method of forming a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1.

Thus, the Applicants submit that claims 1, 3-6, 10-11, and 18-19 are patentable over *Tomita* in view of *Morton*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

6. Claim 2

Claim 2 stands rejected as being unpatentable over *Tomita* in view of *Morton*, and in further view of *Itoh*. The Applicants disagree.

As discussed above, there is no suggestion to modify *Tomita* with *Morton* in a manner that yields the invention as recited in claim 1, from which claim 2 depends. *Itoh*, also discussed above, teaches that the higher the pressure and lower the temperature, the lower the density of a deposited magnesium fluoride film. *Itoh* does not disclose a magnesium fluoride film having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. For the same reasons as discussed previously, the mere fact that *Itoh* discloses a mechanism by which one may adjust the density of a deposited film provides no motivation to alter the disclosed processes of another reference. Moreover, even assuming *arguendo* that such a motivation does exist,

Tomita, *Morton*, and *Itoh* are all silent with regard to why or how to form a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. Therefore, a *prima facie* case of obviousness has not been established as there is no motivation to combine the teachings of *Tomita*, *Morton*, and *Itoh* in a manner which yields the claimed invention.

Thus, the Applicants submit that claim 2 is patentable over *Tomita* in view of *Morton*, in further view of *Itoh*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

7. Claim 9

Claim 9 stands rejected as being unpatentable over *Tomita* in view of *Morton*, in further view of *Itoh*, and in further view of *Ohmi*. The Applicants disagree.

As discussed above, there is no suggestion to modify *Tomita* with either *Morton* or *Itoh*, alone or together. As also discussed above, the only heat treatment of a magnesium fluoride film described in *Ohmi* is in a temperature range of 150 to 450°C. (*Ohmi*, col. 11, ll. 51-61). Therefore, *Ohmi* does not teach or suggest annealing a magnesium fluoride film at a temperature of at least about 600°C, as recited in claim 9.

Moreover, *Ohmi* does not teach or suggest a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1, from which claim 9 depends. Therefore, *Ohmi* may not be used to modify the teachings of the previously cited references to yield a magnesium fluoride coating having a density of at least about 85% and a purity of at least about 99%, as recited in claim 1. Therefore, a *prima facie* case of obviousness has not been established as there is no motivation to combine the teachings of *Tomita*, *Morton*, and *Itoh* in a manner which yields the claimed invention and, furthermore, because any permissible combination of the cited references fails to recite all of the recited limitations of claim 9.

Thus, the Applicants submit that claim 9 is patentable over *Tomita* in view of *Morton*, in further view of *Itoh*, and in further view of *Ohmi*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

CONCLUSION

For the reasons advanced above, Appellants submit that the rejections of claims 1-12, 14-15, and 18-19 as being unpatentable under 35 U.S.C. §103 are improper. Reversal of the rejections in this appeal is respectfully requested.

Respectfully submitted,

Sept 8, 2006

Keith P. TABOADA
Attorney Reg. No. 45,150
(732) 530-9404

Moser, Patterson & Sheridan, LLP
595 Shrewsbury Avenue
Suite 100
Shrewsbury, NJ 07702

CLAIMS APPENDIX
(Appealed Claims)

1. (Original) A method of forming a coated part, comprising the step of:

coating a component part with magnesium fluoride; wherein said magnesium fluoride coating has a density of at least about 85% and a purity of at least about 99%, and said coating reduces corrosion of said component part upon exposure to a corrosive environment.

2. (Original) The method of claim 1, wherein said magnesium fluoride coating has a density of between about 85-90%.

3. (Original) The method of claim 1, wherein said magnesium fluoride coating has a density of about 100%.

4. (Original) The method of claim 1, wherein said corrosive environment comprises fluorine.

5. (Original) The method of claim 1, wherein said coating step is performed at a pressure of not more than about $1x10^{-5}$ torr.

6. (Original) The method of claim 1, wherein said coating step is performed at a temperature of at least about 250°C.

7. (Original) The method of claim 1, wherein said component part comprises aluminum nitride or aluminum.

8. (Original) The method of claim 1, wherein said component part has a surface finish of less than about 10RA.

9. (Original) The method of claim 2, further comprising the step of annealing said coating at a temperature of at least about 600°C.

10. (Previously Presented) The method of claim 1, wherein the coating step further comprises:

coating the component part by chemical vapor deposition.

11. (Previously Presented) The method of claim 10, wherein the coating step is performed at a temperature of at least about 300 degrees Celsius.

12. (Previously Presented) The method of claim 1, wherein the coating step further comprises:

coating the component part by physical vapor deposition.

14. (Previously Presented) The method of claim 12, wherein the coating step is performed in an inert atmosphere.

15. (Previously Presented) The method of claim 14, wherein the inert atmosphere comprises nitrogen.

18. (Previously Presented) The method of claim 1, wherein the coating has a thickness of less than about 2 micrometers.

19. (Previously Presented) The method of claim 1, wherein the coating has a thickness of less than about 1 micrometer.

EVIDENCE APPENDIX

The Applicants state that there is no evidence submitted under 37 C.F.R. §1.130, 1.131 or 1.132, or other evidence entered by the Examiner or relied upon by the Applicants in the Appeal.

RELATED PROCEEDINGS APPENDIX

No copies of decisions rendered by a court or the Board in the related appeal or interference listed on page 2 of this Brief are included as there have been no decisions by the court or the Board in the related appeal or interference listed on page 2 of this Brief.